



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,893	03/09/2004	Lap Chan	CS99-120B	2875

7590

09/14/2005

George O. Saile
28 Davis Avenue
Poughkeepsie, NY 12603

EXAMINER

RAO, SHRINIVAS H

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 09/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/796,893

Applicant(s)

CHAN ET AL.

Examiner

Steven H. Rao

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 25-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☒ Interview Summary (PTO-413)
Paper No(s)/Mail Date. 09/08/2005.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Response to Amendment

Applicants' amendment filed on July 08, 2005 has been entered and forwarded to the Examiner on July 14, 2005.

Therefore claims 25-28 as amended by the amendment are currently pending in the Application.

Claims 1-24 were previously cancelled.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 25 –28 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for, “ intersects with said first network of trenches under an angle of 90 degrees”,(specification pages 8 and 15) does not reasonably provide enablement for intersects with said first network of trenches under angles other than 90 degrees . The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to form first network of trenches under angles other than 90 degrees the invention commensurate in scope with these claims.

As the specification only recites the intersection occurring at 90 degrees, this must be stated in the claims.

Claims 26-28 are rejected for at least depending upon rejected claim 25.

Art Unit: 2814

Appropriate correction is required.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 27 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 27 last line abruptly ends , " said second layer of dielectric trenches is extended in thickness ?" .

It is not understood what amount" , it is not clear from this recitation what Applicants' intend to include or exclude because the claim ends abruptly and is not complete therefore making it impossible to know what is include/excluded.

As previously stated, if applicants intend to recite a range of thickness for the oxide layer deposited over the surface of the second dielectric layer it is suggested that Applicants' recite " 1000 to 4000 angstroms as described in the specification as originally filed (sp. Pg. 16 etc-) .

Appropriate correction is required.

Claim Rejections - 35 USC Section 1 02

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action'.

A person shall be entitled to a patent unless - b) the invention was patented or described in a printed publication in this or a

Art Unit: 2814

foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 25 to 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Kotah (U.S. Patent No. 5,141,896, herein aqer Kotah)

With respect to claim 25 to the extent understood, Kotah describes a multilevel interconnect structure, comprising a semiconductor surface that has been provided with points of electrical contact in the surface of said surface; (Kotah figures 1-5 (1), e.g. figure 2 (a) similar to applicants' fig. 1a etc.) a first layer of dielectric deposited on said semiconductor surface said first layer of dielectric containing a first network of trenches filled with air; (Kotah fig. 2a, etc. # 3,col.3 line 22) a second layer of dielectric deposited on said semiconductor surface said second layer of dielectric containing a second network of trenches filled with air whereby said second network of trenches (Kotah figure 3 a, # 7) is in physical contact with and intersects with said first network of trenches under an angle of known value; (Kotah figures 3a to c) and a layer of oxide deposited over the surface of said second layer of dielectric. (Kotah figure 4c # 11).

With respect to claim 26 to the extent understood, Kotah describes the multilevel interconnect structure of claim 25 whereby further more a network of metal interconnect lines is created on the surface of said layer of oxide. (Kotah figures 1-5L, e.g. # 6, 13, etc.)

With respect to claim 27 Kotah to the extent understood, describes the multilevel interconnect structure of claim 25 whereby further more said layer of oxide

Art Unit: 2814

deposited over the surface of said second layer of dielectric trenches is extended in thickness by a measurable amount. (Kotach figures and col.5 lines 35 to 60).

With respect to claim 28 to the extent understood , Kotach describes the multilevel interconnect structure of claim 27 whereby furthermore a network of metal interconnect lines is created on the surface of said extended layer of oxide. (Kotach figure 4d etc.)

Response to Arguments

Applicant's arguments filed on July 12, 2005 have been fully considered but they are not persuasive. for the following reasons :

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e.,) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicants' contention that , " Fig. 8 (a) of the instant invention shows a three dimensional view of the structure created by the instant invention, with metal contacts 12, there-over created three layers of dielectric in which perpendicularly intersecting trenches, filled with air, have been created, over the surface of which a metal pattern 28 is provided" (underlined portions not recited in claims).

Similarly the alleged difference " compound layer of dielectric layers 14, 18 and 30 of fig. 8 (a) " is not presently recited in the claims .

Similarly Applicants' contention on page 21

Art Unit: 2814

"1. a network of nitride filled trenches formed in the first layer of dielectric "is not presently recited in the claims.

" 2. second network of nitride filled trenches formed second level having been deposited on the first level of dielectric, whereby the second network of nitride filled trenches is in physical contact and intersects with the first network of nitride filled trenches dielectric, the second level of dielectric " is not presently recited in the claims

" 3. first thin layer of oxide deposited over the second layer the openings of nitride filled trenches " is not presently recited in the claims.

"4. openings having been etched in the first thin layer of oxide, the openings to align with intersects between the first network of nitride filled trenches and the second network of nitride filled trenches "is not presently recited in the claims.

"5. the nitride having been removed from the second network of trenches and the nitride having network of trenches, and been removed from the first " is not presently recited in the claims.

" 6. a second thin layer of oxide deposited over the first thin layer of oxide, layer of oxide thereby closing the openings in the first thin layer of oxide" is not presently recited in the claims.

Therefore no patentable weight can be given to any of the above alleged differences nor to any arguments based thereon unless and until these alleged differences are recited in the claims.

Art Unit: 2814

Applicants' contention that Kato provides crossing points for interconnections while instant invention provides air gaps that are mechanically stable is an incomplete reading of Katoh which in col. 2 lines 5-10 describes quasi air gap metallization structure with marked improvement in mechanical strength. (emphasis supplied).

The recitation "separated by a compound layer of dielectric " is not presently recited in the claims and cannot be given patentable weight.

The recitation " in order to create a dielectric of low dielectric constant" is not presently recited in the claims and cannot be given patentable weight.

The recitation " trenches which have been vacated of the therein contained semiconductor material" is not presently recited in the claims and cannot be given patentable weight.

For all the above reasons (none of Applicants' arguments are persuasive, etc.)claims 25-28 are finally rejected for reasons set out above.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

Art Unit: 2814

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (571) 272-1718 . The examiner can normally be reached on 8.00'to 5.00.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see [hop://pair-direct.uspto.gov](http://pair-direct.uspto.gov). Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Steven H. Rao

Patent Examiner

September 08, 2005.



LONG PHAM
PRIMARY EXAMINER